

On motion of Mr. Ord, the University of Pisa was admitted among the correspondents of this Society.

Stated Meeting, August 20.

Present, fourteen members.

Dr. CHAPMAN, President, in the Chair.

Letters were announced and read:—

From the Royal Geographical Society of London, dated London, 27th April, 1847, acknowledging the receipt of the Transactions of this Society:—

From the Secretary of the Commonwealth of Massachusetts, dated Boston, 13th July, 1847, offering to present to this Society a copy of the Map of the Commonwealth of Massachusetts, published by authority:—

From Prof. A. D. Bache, dated Thompson's Station, near Gloucester, Mass., 13th August, 1847, on transmitting a communication from Professor Rümker:—

From the Perpetual Secretary of the First Class of the Royal Institute of the Netherlands, in relation to Prizes instituted and to be instituted by that body:—

From Prof. Henry Reed, dated Bordentown, N. J., 13th August, 1847, accepting the duty of preparing an obituary notice of Prof. Thomson:—

From Messrs. Osgood & Co. of New York, dated 24th July, 1847, offering to devote a column of the Literary World to a notice of the Proceedings of this Society: and,—

From Mr. R. A. Tilghman, dated London, August 3d, 1847, accompanying a communication for the Society, and acknowledging the receipt of notice of his election as a member.

The following donations were announced:—

FOR THE LIBRARY.

Inquiries respecting the History, Present Condition and Future Prospects of the Indian Tribes of the United States. 4to.—*From the War Department, Washington.*

- The Quarterly Journal of the Geological Society of London. Edited by the Assistant Secretary of the Geological Society. No. 10. May 1, 1847. 8vo.—*From the Geological Society.*
- Monthly Notices of the Royal Astronomical Society of London. Vol. VII. April and May, 1847. Nos. 14 and 15. 8vo.—*From the Society.*
- Magnetical and Meteorological Observations made at the Royal Observatory, Greenwich, in the year 1844: under the direction of George Biddell Airy, Esq., M. A., Astronomer Royal. London, 1847. 4to.—*From the Royal Society.*
- The Journal of the Royal Geographical Society of London. Vol. XVII. 1847. Part I. 8vo.—*From the Society.*
- O Auxiliador da Industria Nacional, Nova Serie. Vol. I. No. 11. Abril de 1847. 8vo.—*From the Society.*
- Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. III. May and June, 1847. No. 9. 8vo.—*From the Academy.*
- Journal of the Franklin Institute of the State of Pennsylvania. Vol. XLIV. No. 259. Third Series. Vol. XIV. July, 1847. No. 1. 8vo.—*From the Institute.*
- The African Repository and Colonial Journal. Vol. XXIII. August, 1847. No. 8. 8vo.—*From the American Colonization Society.*
- Minutes of the General Assembly of the Presbyterian Church in the United States of America. The concluding part of Vol. XI. A. D. 1847. 8vo.—*From the Clerk of the Assembly.*
- Proceedings of the National Medical Conventions, held in New York, May, 1846, and in Philadelphia, May, 1847. 8vo.—*From Dr. Isaac Hays.*
- The Medical News and Library. Vol. V. August, 1847. No. 56. 8vo.—*From Messrs. Lea & Blanchard.*
- Annual Report of the Regents of the University of the State of New York. Made to the Legislature, April 24, 1847. 8vo.—*From the Regents.*
- The American Journal of Science and Arts. Conducted by Prof. B. Silliman and B. Silliman, Jr. and J. D. Dana. Second Series. Vol. IV. July, 1847. No. 10. 8vo.—*From the Editors.*
- The Annals and Magazine of Natural History, including Zoology, Botany and Geology. Vol. XVIII. Nos. 121 and 122. Vol. XIX. Nos. 123, 128, 129 and 130. 8vo.—*From Sir William Jardine, Bart.*
- Elementare Darstellung der Analyse der Fixstern-Bedeckungen des

Herrn Geheimen Rath Bessel. Von C. Rümker. Hamburg, 1847. 4to.—*From Professor Rümker.*

Agricultural Botany: An Enumeration and Description of Useful Plants and Weeds, which merit the notice or require the attention of American Agriculturists. By William Darlington, M. D. Philadelphia, 1847. 12mo.—*From the Author.*

A Brief Notice of the Life, Researches and Discoveries of Friedrich Wilhelm Bessel. By Sir J. F. W. Herschel.

ADDITIONS TO THE LIBRARY BY PURCHASE.

Scientific Memoirs. Edited by Richard Taylor, F. S. A. Vol. V. Part XVII. May, 1847. 8vo.

The London, Edinburgh, and Dublin Philosophical Magazine. Vol. XXX. Nos. 203, 204 and 205. June and July, 1847. 8vo.

Astronomische Nachrichten. Nos. 597 to 603, inclusive. 4to.

The Edinburgh New Philosophical Journal. Conducted by Professor Jameson. No. 85. April to July, 1847. 8vo.

A communication from Mr. Richard A. Tilghman, on the Decomposing Power of Water at high temperatures, was read and referred to a Committee, consisting of Prof. Frazer, Dr. Bache and Dr. Patterson.

A communication was read from Professor Rümker, containing his latest observations on the planet Astræa, and also his observations on the Comet lately seen.

My dear Sir,—I take the liberty of sending you herewith the second part of my treatise on occultations of fixed stars, with a few copies for distribution.

I take the opportunity of communicating to you my latest observations of the planet Astræa.

1847.	Mean Hamb. Time.	Apt. A. R. of ♄	Apt. Dec. of ♄	Observa- tions.
	<i>h. m. s.</i>			
March 22,	15 1 10.5	241 52 52.7	—13 41 39.4	17
April 11,	15 13 20.0	241 28 43.3	12 41 5.6	19
13,	13 15 45	241 17 8.8	12 34 15.8	30
20,	13 14 49	240 22 6.3	12 7 54.6	10
21,	13 9 23	240 12 41.8	12 4 11.0	19
23,	14 33 43	239 52 13.2	11 56 12.2	14
May 7,	12 10 46	237 3 23.0	11 3 46.3	10
9,	11 55 58.1	236 36 14.8	10 56 59.6	10
10,	12 9 44.1	236 22 15.2	10 53 24.0	18
11,	12 3 23.0	236 8 18.0	10 50 25.8	5
	12 28 0.4	236 8 6.2	10 50 11.8	Mer. Cir.
13,	11 11 53.1	235 40 47.8	10 43 51.0	15
15,	11 7 3.1	235 12 35.5	10 37 40.1	9
16,	12 3 40.7	234 57 52.2		Mer. Cir.
	13 11 13.6	234 57 14.8	10 34 30.1	8
21,	11 39 23.4	233 48 15.1	—10 21 11.0	Mer. Cir.
24,	11 24 53.1	233 7 28.9	10 14 31.4	Mer. Cir.
	12 12 9.9	233 7 12.0	10 14 12.0	7

I join here my observations of the Comet lately seen.

1847.	Mean Time, Hamburg.	Apt. A. R. of ♄	Apt. Dec. of ♄
May 18	11 <i>h.</i> 4 <i>m.</i> 46.9 <i>s.</i>	150° 31' 0.8"	+39° 20' 47.1"
19	11 6 44.0	150 29 27.4	39 35 32.3
21	12 50 2.0	150 27 24.4	40 5 50.8
22	12 41 40	150 25 16.6	40 20 30.0

Mr. Niebour, assistant at the Hamburg Observatory, has thence computed :

Perihelion passage, June 18^d.08925 mean Greenwich time.

Longitude of $\left\{ \begin{array}{l} \text{Perih. } 135^{\circ} 2' 29'' \\ \Omega \quad 173 \quad 27 \quad 53 \end{array} \right\}$ Apt. eq. March 19.

Inclination, 80 36 22

Log. Perih. Dist. 0.3209050

Motion retrograde.

Believe me, dear Sir,

Yours, very faithfully,

C. RÜMKER.

To Prof. A. D. BACHE,

Sec. of the American Phil. Society.

Mr. M'Culloh made some observations on the application of polarized light to chemical analysis.

After alluding briefly to the discovery of the property of circular polarization in quartz, by M. Arago, and to the subsequent investigation, by M. Biot, of the laws of that phenomenon, as exhibited by certain liquids as well as by quartz, Mr. M'Culloh remarked, that but few analytical chemists seem to have availed themselves of the advantages which circular polarization presents for the extension of chemical knowledge. They appear to have considered its application to practical purposes beset with laborious algebraic calculations, and troublesome manipulations. And some who have only made a few imperfect analysis by this optical method of M. Biot, have even ventured to assert that simpler and quicker methods of attaining the same results are very desirable; while others have doubted the exactness of optical analysis, rather from want of sufficient evidence or information on the subject, than from any positive reason for disbelief.

His attention had been particularly devoted to this subject, in consequence of a very extensive series of chemical researches in relation to the manufacture of sugar, and the chemical nature of the cane and its various products; which researches were made by him under the superintendence of Prof. A. D. Bache, and the direction of the Secretary of the Treasury, in obedience to an act of Congress. In the performance of these researches, he had also been assisted by Mr. Reynolds, an able young chemist of this city. They were designed to obtain information for the use of the government, and indirectly to promote the sugar industry of our country. Several hundred saccharine substances were carefully analyzed; and the processes of manufacture and refining in Cuba and the United States were fully examined. The practical results thus obtained, constitute the subject of a report made to the Secretary of the Treasury, and by him communicated to the Senate at the close of the last session of Congress.

Incidentally, these investigations had served to throw light upon matters of a purely scientific nature; which had, therefore, been omitted, as inappropriate in the report to Congress; but which, for that very reason, were proper subjects for the attention of this Society.

He had referred to his labours thus particularly, that he might justify himself in presuming to pronounce incorrect the opinions of chemists of acknowledged reputation and skill. And he thought

that, after having been constantly occupied, for nearly two years, in making chemical investigations by means of polarized light, he might venture to speak with some confidence upon these matters, without being guilty of immodesty.

With reference to the objection, that the mathematical calculations are troublesome, he observed, that they are perfectly simple, and may be performed by mere arithmetical multiplication, division, &c.; that logarithms facilitate them; and that, by varying only the substance, all other circumstances being constant, the calculations of a series of optical results become as short and as easy as those of quantitative analysis made by the ordinary dry and humid methods with the common balance.

As the result of the experience of Mr. Reynolds and himself, after many hundred analyses, he stated, that five or six independent and complete analyses may be made in a day by a single person, and that by introducing method into all the manipulations, even a larger number may readily be performed. He, therefore, believed that no objection of time can be urged against such analyses; nor would any one familiar with the manipulations of modern analytical chemistry find just cause to complain of those of optical examinations after a few days practice.

Of the accuracy of quantitative determinations by circular polarization, he observed that the theory of the method is based upon rigid mathematical deduction, and is, therefore, perfectly exact; all possible errors are consequently those of observations only. The mean error of reading an angle of rotation, with the apparatus he had employed, does not exceed one-tenth of a degree, which for solutions of sugar corresponds to 0.002, or two-tenths of a per cent. The most exact assays of gold or of silver, by the humid method of Gay Lussac, made by experienced assayers at the mint of the United States, with balances far more delicate than those employed by analytical chemists, are affected with a probable error of 0.0002, plus or minus. Hence optical determinations compare advantageously with the results of ordinary analysis. That such determinations are fully entitled to confidence, is also proved by checking them with other methods, and especially that of applying them to known synthetical mixtures.

In conclusion, Mr. McCulloh remarked, that he had for some time been prevented, by official and other duties, from completing a series of experimental researches with reference to the effects of temperature upon the phenomena of circular polarization, and also concerning the

nature of the union, whether chemical or mechanical, which takes place when solid substances are dissolved in water, alcohol and other liquids. He hoped, however, to be able to present these investigations in a definite form to the Society before long. And he considered the subject one full of interest and importance, by reason of its intimate connexion with the molecular forces and constitution of matter, and its relation to certain recently discovered electro-dynamical phenomena.

On motion of Dr. Patterson, the Proceedings of the Society for the present year were directed to be sent to the publisher of the Literary World, New York.

Pending nomination, No. 197, and new nominations, Nos. 198—201, were read.

Stated Meeting, September 17.

Present, twenty-three members.

Dr. CHAPMAN, President, in the Chair.

Mr. Townsend, a member of a corresponding society, was introduced.

A letter was received and read:—

From the Royal Bavarian Academy of Sciences, dated Munich, 24th of April, 1847, acknowledging the receipt of Transactions and Proceedings of this Society, and of Dr. Duglison's Public Discourse on Mr. Du Ponceau.

The following donations were announced:—

FOR THE LIBRARY.

Report of the Sixteenth Meeting of the British Association for the Advancement of Science; held at Southampton, in September, 1846. London, 1847. 8vo.—*From the British Association.*

Abhandlungen der Mathematisch-Physikalischen Classe der Koeniglich Bayerischen Akademie der Wissenschaften. Vierter Band die Abhandlungen von den Jahren 1844–46, enthaltend. München, 1846. 4to.—*From the Royal Academy of Munich.*